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Hydraulic Structures-The Future of Design

Thomas North

thomas.l.north@usace.army.mil

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Reconfiguring, Replumbing and Repurposing Hydraulic Structures - Responding to New Realities

Thomas North, P.E., F. ASCE/SEI¹,

¹U.S. Army Corps of Engineers
1201 NE Lloyd Blvd Suite 400
Portland, OR 97232-1257
USA

E-mail: Thomas.L.North@usace.army.mil

KEYNOTE - EXTENDED ABSTRACT

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The state of the art of design of hydraulic structures is changing rapidly. Although hydraulic structures include a broad spectrum of applications, there is an increasing need for specialization in planning, design, materials, construction, risk and hazard assessment, aging infrastructure, and lifecycle maintenance.

Today's role of hydraulic structures involves improving water management practices, water quality, and environmental restoration and protection. Hydraulic design has expanded to include water planning as well as improvements in the design, construction, operation, and maintenance of locks, dams, spillways, and outlet works. The challenges affecting planning and design involve understanding the role of government policies, economics, optimization, and risk analysis for a wide range of uses that include flood control, irrigation, power generation, navigation, domestic and municipal supply, environmental, and recreation.

Given the enormous problems in water engineering, design of hydraulic structures will remain relevant in the future. Hydraulic structural design is complex. It requires significant coordination of multiple disciplines, three-dimensional analysis, a complex and time-consuming contractual process, and extensive plans and specifications packages. For existing hydraulic structures, the concern for safety and risk evaluation of existing structures is becoming a growing area of need as materials age, hydrologic methods improve, and the technology for evaluations improve.

In order for hydraulic design to meet the needs of the future, there needs to be discussion on how to bridge the gap between research and practice, identification of knowledge gaps, providing experience, encouraging continuing education, development of competent data bases, and promoting collaboration with other organizations in the advancement and understanding of hydraulic structures.

To accomplish these goals, engineers need to step up as leaders to turn ideas into solutions, to adapt innovation, to influence governments and societies in a meaningful way, to solve the problems of an aging infrastructure through sustainability and resilience, and to meet current environmental needs. Engineers must be engaged, involved, and proactive in shaping the future of global engineering of hydraulic structures.
